

CREW HEALTH

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ABSTRACT

Crew health concerns for Space Station Freedom are numerous due to medical hazards from isolation and confinement, internal and external environments, zero gravity effects, occupational exposures, and possible endogenous medical events. The operational crew health program will evolve from existing programs and from life sciences investigations aboard Space Station Freedom to include medical monitoring and certification, medical intervention, health maintenance and countermeasures, psychosocial support, and environmental health monitoring. The knowledge and experience gained regarding crew health issues and needs aboard Space Station Freedom will be used not only to verify requirements and programs for long duration space flight but also in planning and preparation for Lunar and Mars exploration and colonization.



CREW HEALTH

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- o How does SSF utilization depend upon crew health?
- o How does the field of Space Medicine plan to utilize SSF?

IMAGINE...

- Health (short term, long term)
- Well-being
- Performance
- Mission schedule
- Mission goals
- Mission success
- Program viability

MEDICAL HAZARDS OF SPACE FLIGHT

1. Zero - Gravity
 - a. Physiological changes (cardiovascular, musculoskeletal, etc)
 - b. Illnesses (SMS)
2. Isolation / Confinement
 - a. Psychosocial stress
 - b. Nutritional deficiency
 - c. Infectious disease
3. Environment
 - a. External (radiation, vacuum)
 - b. Internal (noise, toxic exposure, vibration)
4. Space flight (general)
 - a. Trauma
 - b. Endogenous illness
 - c. G-forces (acceleration, impact)

COMPREHENSIVE HEALTH CARE PROGRAM

- 1. Medical Assessment and Certification**
- 2. Countermeasures Implementation**
- 3. Medical Intervention**
- 4. Psychosocial Support**
- 5. Environmental Health Monitoring**

for ALL mission phases:

Preflight - Inflight - Postflight

NASA Medical Care Systems for Space Flight

- o Provide monitoring, diagnosis and treatment for:**
 - first aid and routine simple medical events**
 - emergencies (incl. decompression sickness)**
 - dental**
 - stabilization and transport for more serious illnesses and injuries**
- o Space Shuttle = Shuttle Orbiter Medical System (SOMS)**
- o Space Station = Crew Health Care System (CHeCS)**
 - Health Maintenance Facility**
 - Environmental Health System**
 - Exercise Countermeasures Facility**

SPACE MEDICINE UTILIZATION OF SSF

- 1. Establish baselines and norms for humans in space, isolation and confinement (closed systems.)**
- 2. Develop and verify monitoring and countermeasures.**
- 3. Gain operational experience in remote health care, verify procedures and protocols.**
- 4. Testbed for Lunar and Mars health care systems.**

OPERATIONAL RESEARCH AND DEVELOPMENT

- 1. Medical intervention technologies**
- 2. Remote monitoring and diagnostic technologies (non-invasive)**
- 3. Circadian shifting**
- 4. Telemedicine**
- 5. Decontamination and toxic management strategies**
- 6. Medical computer informatics and expert systems**
- 7. Extended life pharmaceuticals**
- 8. Blood and fluid replacement systems**
- 9. Radiation protection**
- 10. Crew selection and psychosocial support**
- 11. Packaging logistics**

GOAL

**PROVIDE A PROGRAM OF COMPREHENSIVE HEALTH CARE
NECESSARY TO ENABLE A HEALTHY AND PRODUCTIVE
CREW THAT IS ABLE TO ACCOMPLISH MISSION GOALS,
AND TO AVOID LONG TERM NEGATIVE CREW HEALTH
CONSEQUENCES.**

QUESTIONS ?

*SESSION 3:
TECHNOLOGY RESEARCH*

SPACE STATION FREEDOM UTILIZATION CONFERENCE

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